Trans-Pacific HDR Satllite Communications Experiment Phase-2 : Project Plan and Experimental Network

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The trans-Pacific high data rate (TP-HDR) satellite communications experiment was proposed at the Japan-U.S. Cooperation in Space (JUCS) Program Workshop held in Hawaii in 1993 and remote high definition video post-production was demonstrated as the first phase trial. ATM-based 45 Mbps trans-Pacific link was established in the frist phase, and the following experiments with 155 Mbps was planned as the phase 2. This paper describes the experimental network configuration and project plan of TP-HDR experiment phase 2.

The experimental network is shown in figure 1. The Intelsat will be used to provide connection between Japan and the United States. CRL (Kashima Space Research Center (KSRC) and AT&T (Salt Creek are the gate stations in both sides. Domestic connections in both sides can be chosen from a few options. In Japan, we will use NTT (N-STAR to connect application site and KSRC. Another option is to utilize terrestrial Gigabit network which is provided for research purposes by the Ministry of Posts and Telecommunications. In this case, we should consider the way to connect KSRC and application site to the nearest nodes of the Gigabit network. In the U.S., NREN will be used for domestic connection. We think that ACTS satellite link can be used as a backup link. Application sites in both sides will be connected through these links at the transmission rate of 155.52 Mbps and TCP/IP over ATM or ATM native protocols are employed. In case that TCP/IP is used, we try to evaluate the performance of TCPSAT modification.

We are preparing two kinds of application demonstrations. One is the remote astronomical observation and the other is visible human data retrieval / processing. The remote astronomical observation is the idea to utilize time diference between Japan and the U.S., which means we can observe night sky in the U.S. in Japan in day time, for example. In addition, networking collaboration system such as tele-conferencing and white board software will help to realize tele-education or distributed research environment system.
Visible human data retrieval / processing application is one of the degital library applications. Researchers in Sapporo Medical University (SMU) already developed an application software to process huge data stored in National Library of Medicine (NLM) (Bs visible human database. In addition, other medical research related applications such as remote microscope manipulation software via the internet are also developed. We plan to demonstrate these tele-medicine applications.

We are now the finalizing stage of networking design, and plan to start connection verification from April, then start trans-Pacific link quality measurement and fundamental protocol test. Then demonstrations will be done until the end of September.